

APPENDIX D
EXAMPLE FACILITY HAZARD ANALYSIS

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Fire Protection
 Subsystem: Building Design and Construction

Date: July 11, 1997
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 Prepared by: Wal Syphrum

Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
1.1.01	Fire spreading through buildings or structures.	Materials selected during design or construction are not fire-rated or are combustible.	Contribute to fire spreading possibly causing injury and equipment and facility damage.	IC	Select construction materials in accordance with industry standards for fire prevention. Shall not use combustible materials in building construction for a non-combustible building. Follow requirements for a UBC type I fire-resistive building.	IE	3	1	UBC Ch. 18; UBC Ch. 17; UBC Ch. 5	Closed
1.1.02	Excess storage of hazardous materials. Quantities of hazardous materials for a control area exceeds those listed in UBC Tables No. 9-a or 9-b.	Design does not consider the quantities nor types of hazardous materials during laboratory layout and control area definitions.	Personnel injury or illness from hazardous materials.	IIB	Review overall, control area, and individual laboratory unit quantities and types of hazardous materials, liquids and chemicals presenting a physical or health hazard. Ensure maximum quantities per control area do not exceed UBC tables 9-a or 9-b.	IIE	3	1	UBC 702(c)3.; UBC Ch.9	Closed
1.1.03	Excess storage of hazardous materials. Quantities of hazardous materials for a control area exceeds those listed in UBC Tables No. 9-a or 9-b.	Increased quantities of hazardous materials during continued operations may change the hazard level of the facility.	Personnel injury or illness from hazardous materials.	IIB	Periodically the quantities of chemicals that are used and stored in the entire facility and per control area, especially if operations change. Ensure that adequate safety precautions are taken if occupancy classification changes.	IIE	3	1	UBC 702(c)3.; UBC Ch.9	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Fire Protection
 Subsystem: Fire Suppression

Date: July 11, 1997
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 Prepared by: Wal Syphrum

Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
1.2.01	Failure to automatically suppress fire.	Automatic fire suppression system not present.	Fire/explosion. Unchecked fire growth causes increased property damage and risk to personnel, including firefighters.	IC	NSS 1740.11 Ch. 502(a) States, "Automatic sprinkler protection shall be provided for all COF Funded building/facility construction." The sprinkler system should be a wet pipe system. Design in accordance with applicabel codes.	IE	3	1	NSS 1740.11 Ch. 502(a);NFPA 13, NFPA 25;OSHA 1910.159	Closed
1.2.02	Automatic sprinkler system malfunctioning. Failure to automatically suppress fire.	The automatic fire suppression system did not have a system acceptance prior to facility operations.	Fire. Unchecked fire growth causes increased property damage and risk to personnel, including firefighters.	IC	The installing sprinkler contractor shall: (a) notify the authority having jurisdiction and owner's representative of the time and date testing will be performed. (b) perform all required acceptance tests of NFPA 13 ch. 8.:(c) complete and sign the inspection forms.	IE	3	1	NFPA 13 Ch. 8;OSHA 1910.159(c)(3)	Open
1.2.03	Water-based fire protection system is not operating properly. Failure to automatically suppress fire.	Automatic fire suppression system not inspected, tested, and maintained properly (after facility acceptance).	Fire/explosion. Unchecked fire growth causes increased property damage and risk to personnel, including firefighters.	IC	The water-based fire protection system shall be properly inspected, tested, and maintained in accordance with NFPA 25 to met the original design specifications. Gsfcc shall be responsible for maintaining the system and keeping the system in good operating	IE	3	1	NSS 1740.11 Ch. 502(i);NFPA 25, NFPA 13 Ch. 9;OSHA 1910.159(c)(2)	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Fire Protection
 Subsystem: Fire Department Operations

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
1.3.01	Fire/explosion (fire service problems).	Lack of adequate access (by fire department and emergency responders) to facility hinders fire suppression activities.	Creates fire damage and injuries. Also subject fire service personnel to unnecessarily hazardous working conditions.	IB	Provide adequate fire service access (by fire department and emergency responders) to facility in order to allow for rapid response to fire and to ease individual threats of injury. Provide well marked fire lanes.	IE	3	1	UFC Article 10 Div. II and Div. III; Prince George's County Fire Department	Closed
1.3.02	Fire spreading.	Design does not consider the adequate number and placement of working standpipe connections.	Catastrophic personnel injury or possible death, or loss of equipment or system, due to loss of control of fire due to inadequate or unavailable standpipe connections.	IC	Provide adequate number of well placed standpipe connections for fire department connection during a fire. A standpipe shall be located 1) at every floor of every required exit stairway, 2) at the highest landing of stairways with stairway access to the roof.	IE	3	1	NFPA 14 specifically Ch. 5-3.2; UBC 3805; UFC 10.510	Closed

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Fire Protection
 Subsystem: Detection, Alarm, Monitoring, and Communications

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 Prepared by: Wal Syphrum

Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
1.4.01	Undetected fire. Personnel, emergency responders, and fire department unaware of fire/emergency.	Inadequate or lack of fire detection alarm/ system.	Unchecked spread of fire. Personnel injury and equipment loss.	IC	Ensure adequate fire detection, alarm, and communications systems are designed / incorporated into fire protection system.	IE	3	1	NSS 1740.11 Par. 603-604;NFPA 72;NFPA 101 Ch. 7-6;NFPA 101 Ch. 26-3.4;OSHA 1910.164-165;UFC Article 14	Closed
1.4.02	Personnel not adequately alerted of fire/emergency.	Inadequate or lack of fire alarms for occupant notification.	Personnel not escaping from area/ building. Personnel injury.	IC	Occupant notification shall provide signal notification to alert occupants of fire or other emergency. Alarms should be both audible and visible, and adequately located.	IE	3	1	NFPA 101 Ch. 7-6.3;NFPA 101 Ch. 26-3.4.3;NFPA 72 Ch. 6;OSHA 1910.165;UFC 14	Closed
1.4.03	Personnel not adequately alerted of emergency situation.	Warnings and alarms, such as fire alarm bells/buzzers, not loud or noticeable enough for all personnel in all operating conditions.	Personnel injury or death, equipment damage or loss.	IC	Ensure that all operating scenarios, including personnel location and ambient noise levels, are considered in designing layout/location, loudness, etc. Of alarm systems, including fire alarms. Ensure audible alarm can be effectively heard.	IE	3	1	NFPA 72 Ch. 6-3;NSS 1740.11 Par. 603(k)(2);NSS 1740.11 Par. 603(f)	Closed

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Exposure Control
 Subsystem: Ventilation

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
2.1.01	Entrainment of contaminated exhaust air by facility fresh air intakes.	Improper location of outside fresh air intakes.	Unpleasant odors, potentially acute and systemic toxic health effects to building occupants.	IIB	Locate outside fresh air intakes to avoid drawing in hazardous chemicals, combustion material, or flammable vapors, and to minimize hazard from fires coming from either the building itself or from other structures.	IIE	3	1	NFPA 90A Sec. 2-2.1;NFPA 45 Ch. 6-4.1;ASHRAE HANDBOOK-1989-Fundamentals Ch. 14 "Airflow Around Buildings", ACGIH Industrial Ventilation, 21st edition Ch. 5	Closed
2.1.02	Accumulation of indoor air contaminants.	Inadequate supply of fresh outdoor air.	Feeling of "stuffiness", unpleasant odors, potentially acute and systemic toxic health effects for personnel, affecting morale and productivity.	IIIC	Design system to provide outdoor air to meet minimum requirements of ansi/ashrae standard 62-1989.	IIIE	3	2	ASHRAE Standard 62-1989	Closed
2.1.03	Fire spreading rapidly through HVAC ducts within building.	Unsafe fire protection in construction materials for HVAC duct work.	Contribute to fire spreading possibly causing injury or death and equipment and facility damage.	IC	Hvac ducts and plenums should be constructed entirely of noncombustible, nonporous materials (ul standard 181). Their construction should comply with NFPA and other industry standards.	IE	3	1	NFPA 90A;UL Standard 181	Closed

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Exposure Control
 Subsystem: Exhaust

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
2.2.01	Entrainment or reentry of contaminated exhaust air or hazardous chemicals into the building.	Improper design of discharge stacks and exhaust system.	Unpleasant odors, potentially acute and systemic toxic health effects to building occupants.	IIB	Exhaust air shall be discharged above the roof at a location, height, and velocity sufficient to prevent reentry of hazardous chemicals. Design stacks to extend above the eddy zone. Mushroom exhaust fans are not permissible for local exhaust systems.	IIE	3	1	NFPA 45 Sections 6-4.1 & 6-8.7; NFPA 91 Sec. 2-11; ASHRAE Handbook-1989-Fundamentals Ch. 14 "Airflow Around Buildings", ASHRAE Handbook-1991-HVAC Applications Ch. 14 "Laboratories"; ACGIH Industrial Ventilation, 21st Edition Ch. 5	Closed
2.2.02	Contamination of air immediately outside facility	Exhaust of toxic gases/fumes at too low level near facility	Environmental contamination, personnel injury or illness to persons on roof or near the facility.	IIB	Ensure that exhaust stacks from facility are at sufficient heights to avoid contamination of atmosphere around facility in regards to personnel.	IIE	3	1	ASHRAE Handbook-1989-Fundamentals, Ch. 14; NFPA 45 A. 6-8.7; ACGIH Industrial Ventilation, 21st Edition	Closed
2.2.03	Contamination of air immediately outside facility.	Exhaust of toxic gases/fumes at low level on roof or near the facility.	Environmental contamination, personnel injury or illness to persons on roof or near the facility.	IIB	Periodically test the roof and area surrounding the facility for possible air contamination, and to ensure that exhaust stacks are at sufficient heights. Perform tests when utilizing new hazardous materials.	IIE	3	1	ASHRAE Handbook-1989-Fundamentals, Ch. 14	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Exposure Control
 Subsystem: Personnel Safety

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
2.3.01	Prolonged effect of chemical burns, eye damage, contaminated personnel.	Failure to provide equipment needed to decontaminate personnel handling hazardous materials/waste that may have come in contact with eyes, clothing or skin. Lack of or no eyewashes / emergency showers.	Personnel injury including loss of eye sight and burns from exposure to strong acids and bases.	IIB	Provide eyewash and overhead deluge emergency stations (showers) within 25 feet or 15 seconds travel time from the hazard or work station. Units should be easy to locate and in the path of normal egress.	IIE	3	1	ANSI Z358.1; OSHA 1910.151(c); NSC DATA SHEET 1-686-80	Open
2.3.02	Prolonged effect of chemical burns, gas fumes in eyes.	Inadequate types, water supply, and controls of eyewashes and emergency showers.	Personnel injury.	IIC	Provide adequate types, water supply, and controls of eyewashes and emergency showers.	IIE	3	2	NSC DATA SHEET 1-686-80	Closed
2.3.03	Prolonged effect of chemical burns, gas fumes in eyes.	Personnel are not trained to operate eyewashes and emergency showers. System not functioning properly.	Personnel injury.	IIC	Provide adequate training for eyewashes and emergency showers. Periodically test eyewashes and emergency showers for their correct operations.	IIE	3	2	NSC DATA SHEET 1-686-80	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Exposure Control
 Subsystem: Hazardous Materials

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
2.4.01	High hydrogen concentration leads to a fire or personnel asphyxiation.	Lack of hydrogen gas detection devices in facility.	Personnel death, fire, or explosion.	ID	Provide hydrogen gas detectors in laboratory areas which store and use hydrogen gas. Provide emergency power to the gas detection system. The alarm should sound both locally and in the emergency console in building 24.	IE	3	2		Closed
2.4.02	Release of toxic or highly toxic gases.	Lack of means to detect toxic and highly toxic gases in facility.	Personnel death or illness.	IIA	Provide a continuous gas detections system to detect the presence of gas at or below the permissible exposure limit or ceiling limit in laboratory areas which store and use toxic and highly toxic gases. See appendix a for listing of gases and locations.	IIE	3	1	UFC 80.303(a)(9);UFC 80.303(a)(7)	Open
2.4.03	Undetected build-up of hydrogen gas and/or toxic gases.	Gas detection system inoperable due to failure to accurately calibrate gas detectors and system.	Fire/ explosion. Personnel death or illness.	IB	Provide accurate calibration of all gas detectors and system.	IE	3	1		Open

Facility Hazard Analysis

Project: Earth Systems Science Building
System: Exposure Control
Subsystem: Radiation

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
2.5.01	Non-ionizing radiation.	Radio frequency, infrared, ultraviolet radiation associated with processing equipment operation.	Health effects to personnel performing maintenance or operations.	IIB	Design equipment installation protocols to verify equipment radiation systems integrity. Establish safety protocols for maintenance and operation of equipment and systems.	IIE	3	1	OSHA 1910.97	Open
2.5.02	RF(radio-frequency), emr (electromagnetic radiation) or other non-ionizing radiation.	Equipment in laboratories emitting non-ionizing radiation.	Personnel injury due to non-ionizing radiation effects.	IIIB	Ensure that all equipment in laboratories which emit non-ionizing radiation are shielded to prevent harmful emissions. Personnel must use necessary protection. Ensure that equipment and laboratories are properly labeled for all hazards.	III D	3	2	OSHA 1910.97	Open
2.5.03	High noise level in work areas.	Excessive equipment noise.	Personnel may receive wrong instructions causing increased chance of accident. Communication during emergency may be hampered.	IIC	Keep the lowest possible noise emission level in all work areas and in accordance with nasa and osha recommendations.	IIE	3	2	NHS 1845.4;OSHA 1910.95;OSHA 3048 - "Noise Control, A Guide For Workers And Employers"	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Material Handling
 Subsystem: Storage

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
3.1.01	Increased risk of fire, explosion, and/or generation of toxic gases.	Accidental mixing of reactive materials with incompatible substances such as water, corrosive, toxic, or flammable materials, or other reactive substances, due to improper storage of reactive chemicals.	Personnel injury or death, and property loss may occur.	IC	Provide physically separate storage areas (rooms) for incompatible materials. Numerous storage areas may be required depending on the number and types of reactive chemicals stored. The hazards of each reactive material must be carefully reviewed for proper storage conditions.	IE	3	1	UBC Ch. 9; NFPA 30, NFPA 45; OSHA 1910.106; UFC 79; UFC 80	Closed
3.1.02	Increased risk of fire, from the improper storage of reactive materials.	Accidental mixing of reactive materials, such as: toxics or corrosives, flammables, etc.) With incompatible chemicals.	Personnel injury or death and property loss may occur.	IC	Provide separate chemical storage cabinets for incompatible materials. Numerous cabinets may be required depending on the number and types of reactive chemicals stored. Provide cabinets for flammable materials and other cabinets for other hazardous materials. Provide raised sills or spill trays in cabinets for spill protection.	IE	3	1	NFPA 30, NFPA 45; UFC 79, UFC 80; OSHA 1910.106	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Material Handling
 Subsystem: Transfer, Delivery, and Movement

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
3.2.01	Build-up of static electricity.	Measures for prevention of static charge build-up are inadequate or nonexistent for chemical transfer operations.	Explosion/fire. Personnel injury/death. Equipment and facility damage/loss.	IB	Dissipation of charge is accomplished by grounding container through a closed connection (contact is made before flow starts and is broken after flow is completed).	IE	3	1	NFPA 77 CH. 4-4	Open
3.2.02	Open container knocked over, causes liquid chemical spill.	Improper container storage.	Fire/explosion, property damage, personnel injury, death.	IB	Provide proper transfer equipment that supports containers. Prevent unsupported open containers.	ID	2	1	OSHA 1910.106;OSHA 1910.176;NFPA 45	Open
3.2.03	Fire/explosion.	Vapors created during transfer operations. Leak in transfer piping/equipment.	Property damage, personnel injury, death.	IB	Provide proper equipment and training for proper transfer operations. Provide maintenance program for all transfer equipment. Follow manufacturers' specifications.	ID	2	1	OSHA 1910.106;NFPA 30	Open
3.2.04	Overflow of chemical during transfer.	Improper transfer procedures and/or equipment. Untrained personnel performing transfer operations.	Fire/explosion, property damage, personnel injury, death.	IB	Use only approved transfer equipment with safety features. Establish appropriate procedures and training. Provide vent line for liquid nitrogen (In2) transfer.	ID	2	1	OSHA 1910.106;NFPA 30;UFC	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Material Handling
 Subsystem: Spills and Leaks

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
3.3.01	Wet floor creates dangerous operating conditions.	Water/fluid releases from equipment. Improper drainage design for spills.	Personnel injury due to shocks (if electrical equipment present) or slips and falls.	IIA	Ensure that equipment design has own spill containment. Ensure proper drainage design to facilitate clean-up of water/fluid spills.	IIE	3	1		Open
3.3.02	Slippery floors on walkways or in working areas.	Smooth, slick floors. Spilling of fluids including cleaning solutions onto walkways and working surfaces.	Personnel injury due to slips and falls or electrical shocks if electrical equipment is present.	IIIA	Ensure that procedures facilitate clean-up of all spills as soon as possible after discovery. Place signs in slippery floor areas to warn occupants of slippery floors. Ensure that operating procedures preclude operating equipment when floor is wet.	III D	3	1	OSHA 1910.22(a)	Open
3.3.03	Failure to clean any spill.	Improper procedures.	Fire/explosion, property damage, personnel injury, death.	IC	Train personnel in proper spill handling actions. Provide necessary equipment and materials.	IE	3	1	OSHA 1910.106;OSHA 1910.120;NFPA 1;Site CHEMICAL HYGIENE PLAN	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Material Handling
 Subsystem: Disposal/Waste

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
3.4.01	Explosive and/or toxic environment developing.	Improper handling or storage of hazardous waste materials inside the facility.	Personnel injury.	IIB	Ensure that all material retained following a spill inside the facility is treated as hazardous waste. Store the waste in approved labeled containers. Take necessary precautions during storage or have the hazardous waste professionally removed from the site.	IID	2	1	OSHA 1910.38;OSHA 1910.120;OSHA 1910.1450;EPA Regulations; Site Chemical Hygiene Plan	Open
3.4.02	Release of toxic, flammable or explosive fumes or liquids.	Failure to provide adequate waste containers in laboratory areas and storage area.	Possible exposure to toxic fumes and fire which may result in personnel injury or death and equipment and facility damage.	IC	Provide suitable disposal containers that are labeled "hazardous waste" and indicate permissible contents. Ensure sufficient quantity of containers are available to allow segregation of solvents, flammables, etc.	IE	3	1	OSHA 1910.106;;Site Chemical Hygiene Plan	Open
3.4.03	Exposure of environment or unprotected personnel to toxic material deposits.	No checking or control of ducts or hoods.	Environmental contamination, unsafe operating areas.	IIB	Ensure that all ducts or hoods, are checked for toxic deposits/build-ups. Dispose toxic deposits appropriately. Develop special procedures for this work.	IIE	3	1		Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Material Handling
 Subsystem: Handling/Use

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
3.5.01	Personnel exposure to various hazardous materials.	Unsafe handling of acids, bases, and solvents, including possible incompatible storage combinations.	Personnel injury or illness.	IIA	Ensure that all appropriate safety measures are undertaken during material handling. Ensure that compatibilities are considered during planning of handling and storage operations.	IIIE	3	1	OSHA 1910.1450;;Site Chemical Hygiene Plan	Open
3.5.02	Exposure of hazards to unprotected personnel.	Handling hazardous chemicals and materials in unprotected or unsafe areas (such as office corridors) can expose others to hazards.	Injury to unprotected personnel.	IIB	Ensure that hazardous materials and chemicals are handled only in areas properly designated and protected. Provide separate facility entrances and corridors if required. Provide carts and buckets for transport of chemicals.	IID	2	1	UFC 80;;Site Chemical Hygiene Plan	Open
3.5.03	Fire and/or explosion	Improper operating procedures. Incompatible materials being transferred/ handled/ used react with each other.	Personnel injury and/or equipment damage or loss.	ID	Ensure proper operating procedures. Provide personnel training in safety features. Post signs addressing the use of incompatible materials. Keep incompatible materials separated from each other at all times.	IE	3	2	NFPA 45, NFPA 318;NFPA 49, NFPA 491M	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Material Handling
 Subsystem: Bulk Systems

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
3.6.01	Loss of liquid nitrogen storage tank integrity.	Premature storage tank corrosion.	Potentially extensive and environmentally harmful ground or groundwater contamination.	IIB	Provide proper material thickness/ type and/or protective coatings for liquid nitrogen storage tank. Consider all applicable standards and recommendations provided in the selection or design of storage tanks.	IID	2	1	NHB 1700.6; ASME Pressure Vessel; and Boiler Code, Sec. VIII	Open
3.6.02	Chemical/process gas leaks from fittings or connections.	Improper design or installation of process gas piping system.	Personnel injury. Impaired vision. Obstruction of passageways.	IIC	Design and install liquid nitrogen process gas piping systems in accordance with industry standards and regulations. Perform quality leak testing.	IIE	3	2	CGA Standards	Open
3.6.03	Loss of storage tank integrity.	Premature storage tank corrosion.	Potentially extensive and environmentally harmful ground or groundwater contamination.	IID	Place storage tanks on re-certification program to ensure storage tank integrity. Provide periodic inspection.	IIE	3	2	NHB 1700.6	Open
3.6.04	Personnel contact w/ liquid nitrogen.	Improper Dewars fill station set-up or faulty containers.	Personnel injury.	IIIC	Provide properly designed fill station and containers.	III E	3	2		Open
3.6.05	Personnel contact w/ liquid nitrogen.	Faulty containers or improper filling procedures at liquid nitrogen dewar filling station.	Personnel injury.	IIIC	Provide proper containers, and procedures for filling containers at liquid nitrogen dewar filling station.	III E	3	2		Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: General Facility
 Subsystem: Access/Egress

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
4.1.01	Failure to provide adequate number and arrangement of emergency egress.	Insufficient means of egress. Not enough exits. Poor arrangement of exit locations.	Injury or death to occupants due to improper location or lack of adequate evacuation routes during an emergency.	IIB	Provide adequate number of separate means of egress. Exits shall be located and exit access shall be arranged so that exits are readily accessible at all times.	IIE	3	1	NFPA 101 Sec. 5-4; NFPA 101 Sec. 5-5; OSHA 1910 Subpart E; UBC Ch. 33	Closed
4.1.02	Insufficient capacity of egress.	Every component of means of egress does not provide the minimum required width.	Inability for occupants to leave building in a timely manner. Personnel injury.	IIB	Ensure halls, doorways, and other parts of the exit meet the proper occupant loading in order to provide proper capacity of egress.	IIE	3	1	NFPA 101 Sec. 5-3	Closed
4.1.03	Occupants failure to exit building during fire.	Excessive travel distance to nearest exit.	Injury or death to occupants due to excessive travel distances and spreading fire.	IIB	The maximum travel distance, for this mixed assembly/business occupancy, shall not exceed 200 ft. to at least one exit.	IIE	3	1	NFPA 101 Sec. 5-6; UBC Ch. 33	Closed
4.1.04	Confused occupants prevented from exiting building.	Excessive dead-end corridors.	Personal injury.	IIB	Dead-end corridors shall exceed 20 feet.	IIE	3	1	NFPA 101 Ch. 26-2.5.2	Open
4.1.05	Occupants failure to reach a public way during a fire.	Failure to provide suitable travel surfaces. The means of egress ends at the point of exit from the building.	Injury to occupants.	IIB	All exits shall terminate at a public way. The public way for ESSB is the road in front of the building. Provide a paved walkway from the exits at the back of the building and office wings to the public way.	IIE	3	1	NFPA 101 Sec. 5-7; NFPA 101 Sec. 31-1.2.2	Closed

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Generagl Facility
 Subsystem: Electrical

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
4.2.01	Increased danger due to failure of critical and/or emergency systems.	Improper design or installation of emergency power systems.	Increased danger of personnel injury/death or property damage.	IB	Design emergency power source & distribution systems in accordance with required regulations and standards.	ID	2	1	OSHA 1910.308(b);NFPA 70, NFPA 110;;UBC 1716(g) & UBC 1807(i) FOR ATRIUM SMOKE-CONTROL SYSTEM.	Open
4.2.02	Continued operation of equipment under dangerous conditions.	Inability to shut off power to equipment in the event of an accident.	Possible death or severe injury to personnel. Equipment damage.	IC	Provide readily accessible power shut-off switches near all equipment and doors to work areas.	IE	3	1	OSHA 1910.305;NFPA 70;NFPA 70E Ch. 3	Closed
4.2.03	Continued operation of equipment under dangerous conditions.	Inability to shut off equipment in the event of an accident.	Possible death or severe injury to personnel. Equipment damage.	IC	Provide readily accessible power shut-off switches on all equipment that do not have hard wired breakers near the equipment. Ensure that all hazardous equipment are provided with appropriate emergency shutdown provisions. Unused pigtails should be	IE	3	1	OSHA 1910.305;NFPA 70;NFPA 70E Ch. 3	Open
4.2.04	Combustion sparks or other ignition sources.	Motors and equipment operating in explosive environment.	Ignition of vapors and/or flammable and combustible liquids, possible explosion, possible injury or death.	IC	All electrical equipment in an explosive environment must be explosion proof. Use spark proof motors in explosive environment.	IE	3	1	OSHA 1910.106;NFPA 30 (Specifically Ch. 4-7.2), NFPA 70;UFC	Closed

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: General Facility
 Subsystem: Electrical

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
4.3.01	Poor illumination of exits and other means of egress.	Improper design, location, or installation of emergency lighting.	Personnel injury.	IIC	Provide adequate illumination of means of egress. The floors within an exit and within the portions of the exit access and exit discharge (inside the building) shall be illuminated to values of not less than 1 footcandle measured at the floor.	IIE	3	2	NFPA 101 Sec. 5-8;UBC Sec. 3313;UFC Sec. 12.110	Closed
4.3.02	Occupants cannot find their way to an exit.	No lighting for emergency egress following a power outage in the facility.	Personnel injury.	IIC	Provide emergency lighting systems for the means of egress. Where illumination depends on changing energy sources, there shall be no appreciable interruption of illumination. Emergency illumination shall be provide for 1 1/2 hours in the event of	IIE	3	2	NFPA 101 Sec. 5-9;UBC Sec. 3313;UFC Sec. 12.110	Open
4.3.03	Failure of occupants to reach a public way during a fire.	The discharge from exit does not have adequate lighting to the public way.	Injury to personnel.	IIB	The concrete walkway leading from the exits at the back of the building and office wings to the public way should be illuminated and marked to make clear the direction of egress to the public way.	IIE	3	1	NFPA 101 Sec. 5-7;NFPA 101 Sec. 5-8	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: General Facility
 Subsystem: Structural

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
4.4.01	Laboratory floor collapse.	Inadequate floor load design.	Personnel injury and/or death or equipment damage or loss due to floor collapse.	IC	Consider all possible objects, weights of equipment, stored inventory and personnel when designing for floor loads.	IE	3	1	NHB 7320.1B Ch. 6;UBC;OSHA 1910.12;OSHA 1910.22	Closed
4.4.02	Floor collapse (other than laboratory).	Inadequate floor load design.	Personnel injury and/or death or equipment damage or loss due to floor collapse.	IC	Consider all possible objects, weights of equipment, stored inventory and personnel when designing for floor loads.	IE	3	1	NHB 7320.1B Ch. 6;UBC;OSHA 1910.12;OSHA 1910.22	Closed
4.4.03	Roof collapse.	Inadequate loading requirements used in structural design.	Personnel injury or death. Equipment or property damage and/or loss.	IC	Consider all types of anticipated loading when designing roof structures. Consider roof operations and mechanical/electrical equipment on roof.	IE	3	1	NHB 7320.1B Ch. 6;OSHA 1910.12;OSHA 1910.22	Open
4.4.04	Wall collapse.	Inadequate loading requirements used in structural design.	Personnel injury or death. Equipment or property damage and/or loss.	IC	Consider all types of anticipated loading when designing walls. Include design of heavily loaded wall cabinets.	IE	3	1	NHB 7320.1B Ch. 6	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: General Facility
 Subsystem: Elevators

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
4.5.01	Failure of elevator system.	Elevator system not designed to meet loads of required usage.	Personnel injury and/or equipment damage or loss.	IID	Ensure proper design of elevators. Design of passenger elevators should include regular work in addition to conference and cafeteria traffic from people not normally using the facility. Freight elevator should include loads from heavy equipment (lab	IIE	3	2	ASME/ANSI Sec. A17.1- A17.3	Open
4.5.02	Failure of elevator system.	Improper operating procedures (exceeding weight limits). Accidental release of safety latch.	Personnel injury and/or equipment damage or loss.	IID	Ensure proper elevator operating procedures. Provide personnel training in safety features and load limits. Ensure heavy equipment is moved only in the freight elevator. Post signs regarding weight limits.	IIE	3	2	ASME/ANSI Sec. A17.1- A17.3	Open
4.5.03	Failure of electric lifts or other failure in elevators.	Lack of proper, preventive maintenance program.	Personnel injury and/or equipment damage or loss.	IIC	Establish effective preventive maintenance for elevators.	IE	3	2	ASME/ANSI Sec. A17.1- A17.3	Open
4.5.04	Failure of elevator system.	Hoist fails or faulty electrical design/work.	Personnel injury and/or equipment damage or loss.	IID	Provide safety measures for runaway car, and for electrical work (grounding, etc.)	IIE	3	2	NFPA 70 Article 620	Open
4.5.05	Fire spreading to elevator.	Elevator shaft is not separated from the remainder of the building by a fire-rated enclosure.	Personnel injury or major property damage.	IC	Contain fire by providing a two-hour fire rated elevator assembly/ shaft. Elevator car doors shall have a 1 1/2 hour fire rating.	IE	3	1	UBC 5102, UBC 1706; ASME/ANSI A17.1; NFPA 80 Ch. 8	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
System: General Facilities
Subsystem: General

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
4.6.01	Lightning.	Natural phenomena. Inadequate grounding of lightning protection system.	Electrocution resulting in injury or death. Fire resulting from lightning strike.	IC	Provide adequate grounding of lightning protection system.	IE	3	1	NFPA 780;NFPA 70	Closed
4.6.02	Inadvertent release of high pressure steam.	Poor design or workmanship of steam system components, or poor operation.	Possible injury or system failure.	IIIC	Review system design to ensure it meets code and standard requirements. Develop safe operating procedures for steam system in accordance with applicable codes and standards.	III E	3	2	UMC Ch. 21	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Documentation
 Subsystem: Emergency Preparedness

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
5.1.01	Continued flow of utilities (electrical power, gases, water, etc.) Under unsafe conditions or in emergency situation.	Inability to deactivate utilities in the event of an accident. Lack of emergency shut-off switches.	Possible severe injury or death to personnel. Property damage or loss.	IB	Ensure all utilities have easily accessible and well labeled emergency shut-off switches. Provide access to electrical vault.	IE	3	1	NFPA 70 Article 230-70;NFPA 70 Article 230 Part F;NFPA 70 Article 670-4	Open
5.1.02	Continued operation of safety critical equipment or flow of utilities to equipment under unsafe conditions or in emergency situation.	Inability to deactivate equipment and/or utilities to equipment in the event of an accident. Lack of emergency shut-off switches	Possible severe injury or death to personnel. Property damage or loss.	IB	Ensure all sources of energy (equipment power sources and utilities to equipment) have easily accessible and well labeled emergency shut-off switches, valves, etc.	IE	3	1	NFPA 70 Article 230-70;NFPA 70 Article 230 Part F;NFPA 70 Article 670-4	Open
5.1.03	Continued and/or discontinued operation of equipment connected to the motor control centers (mcc), and emergency motor control centers (emcc)	Inability to quickly assess an emergency situation. Possibility of activating and/or de-activating the wrong piece of equipment.	May cause severe injury to persons unaware of situation.	IID	Provide labels to describe the motor control centers, and emergency motor control centers (emcc) panels in detail. For example describe (number) an exhaust fan, its location, and any hazardous materials emitted from it. Provide extra fuses for emccs.	IIE	3	2		Open
5.1.04	Inadequate knowledge of fire procedures.	Failure to conduct fire drills on a regular basis.	Increased danger of personnel injury or death.	IC	Conduct fire exit drills regularly with coordination from local authorities.	IE	3	1	NHB 1700.1(V1-B) Ch. 4;NFPA 101 Ch. 31-1.5;NSS 1740.11 Par. 604(d);NSS 1740.11 Par. 803	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Documentation
 Subsystem: Test Procedures

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
5.2.01	Out-of-spec and unsafe equipment. Unsafe operation of relocated, used equipment.	Moving existing machinery to new location could effect its operation or safety, due to damage during moving, new set-up, etc.	Personnel injury or death and property damage or loss due to accidents resulting from operation of unsafe equipment.	IA	Properly test & certify all relocated equipment to meet operating specifications after being moved to new location and prior to starting normal operations.	ID	2	1	OSHA 1910.212	Open
5.2.02	Damage to equipment caused by poor equipment design or improper installation.	Inadequate testing to assure proper equipment operation prior to use.	Malfunctioning or failed equipment causing personnel injury.	IIB	Conduct pre-operation/ acceptance tests of all equipment installed during construction phase.	IIE	3	1	NFPA 70, NFPA 70E	Open
5.2.03	Damage to equipment caused by poor equipment design or improper installation during laboratory installation phase.	Inadequate testing to assure proper equipment operation prior to use.	Malfunctioning or failed equipment causing personnel injury.	IIB	Conduct pre-operation/ acceptance tests of all equipment installed during lab installation phase.	IIE	3	1	NFPA 70, NFPA 70E	Open
5.2.04	Dangerous operating conditions caused by concurrent construction and testing.	Testing required to continue during construction project.	Possible personnel injury, death, or system damage or loss.	IA	Avoid unnecessary testing during construction, and establish adequate controls and procedures to minimize danger if testing must be conducted concurrent with construction.	IE	3	1	USER CONFIGURATION CONTROL PLAN	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
System: Documentation
Subsystem: Operational Procedures

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
5.3.01	Unsafe and unauthorized operating procedures.	Lack of proper documentation for approved operating procedures, leading to unsafe practices during operations.	Personnel injury or equipment damage.	IIC	Provide comprehensive operations manual to incorporate all operational, material handling, repair, and maintenance procedures. Should include system operation, interfaces, and appropriate hazards associated with each operation.	IIE	3	2	User Configuration Control Plan; User Operation and Maintenance (O&M) Manuals	Open
5.3.02	Unsafe operations during operational phases.	Lack of or inadequate control measures established and followed during equipment installation and operation.	Personnel injury, equipment damage.	IIB	Ensure that management establishes control measures to minimize unsafe or uncontrolled operations.	IIE	3	1	User Configuration Control Plan	Open
5.3.03	Chemical burns, eye damage, contaminated personnel and fire or explosion.	Failure to develop standard analytical procedures and determine potential hazards regarding procedures. Failure to provide safety training for analytical procedures.	Personnel injury. Possible skin disorders. Increased risk of equipment loss and facility damage due to fire.	IIB	Develop standard analytical procedures for lab use. Perform a hazards analysis of procedures. Train personnel on analytical procedures.	IID	2	1	NSC - Fundamentals Of Industrial Hygiene	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Documentation
 Subsystem: Maintenance Procedures

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
5.4.01	Inadequate protection offered by personal protective equipment.	Unchecked deterioration due to inadequate inspection and maintenance.	Personnel injury and/or death due to exposure to hazardous materials or fire. Equipment and facility damage or loss due to fire.	IB	Establish comprehensive preventative maintenance, testing and inspection program for personal protective equipment. Test and certify all respirators, masks, filters, etc.	IE	3	1	OSHA 1910 Subpart I; OSHA 1910.34; Site Chemical Hygiene Plan	Open
5.4.02	Damage to equipment or system failure / degradation.	Inadequate / improper preventative maintenance procedures.	System and equipment damage, possible personnel injury.	IB	Provide recommended (as appropriate or by manufacturer) checks of critical equipment to ensure safe operational conditions. Institute a preventative maintenance program to keep up effectiveness and safety of system and equipment.	IE	3	1	NFPA 70, NFPA 70E; USER OPERATION And MAINTENANCE (O&M) Manuals; User Configuration Control Plan	Open
5.4.03	Possible explosion or ignition of fumes in work area during maintenance procedures.	Unsafe maintenance procedures.	Injury or death of personnel from lack of safety considerations during maintenance procedures.	IB	Do not begin any maintenance work until all explosive or flammable vapors have been removed from area. All metal objects should be grounded, and only spark resistant tools should be used.	IE	3	1	OSHA 1910.106;NFPA 30, NFPA 91;GMI 1700.4 "Hot Work Permit"	Open
5.4.04	Stationary/ fixed chemical tank/ cylinder explosion and fire.	Lack of and/or improper tank/ cylinder maintenance and inspection procedures.	Personnel injury or death. Property damage or loss. Personnel asphyxiation.	ID	Provide for safe and appropriate stationary/ fixed chemical tank/ cylinder maintenance. Insure personnel are properly equipped.	IE	3	2	NFPA 45;NHB 1700.6	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Documentation
 Subsystem: Training

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
5.5.01	Release of toxic, flammable or explosive fumes or liquids inside the facility or to the environment with increased risk of fire, explosion or exposure to toxic materials.	Failure to provide adequate training for identification, collection, packaging and storage of hazardous wastes.	Environmental contamination may result. Possible personnel injury or death may occur. Equipment, personal property or facility damage may also occur.	IB	Provide training on procedures for identification, collection, packaging, storage, and response to hazardous materials incidents.	IE	3	1	OSHA 1910.106;NFPA 30;;Site Chemical Hygiene Plan	Open
5.5.02	Excessive exposure to toxic and hazardous materials.	Inadequate training.	Fire resulting in personnel injury and/or death and equipment and facility damage or loss. Personnel exposure to toxic chemicals resulting in personnel injury and/or death. Environmental damage due to release of hazardous materials.	IB	Provide regular, comprehensive training for laboratory personnel. Training should meet the minimum requirements of the indicated references.	IE	3	1	OSHA 1910.134;OSHA 1910.1200;OSHA 1910.1450;;Site Chemical Hygiene Plan	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Facility Operation
 Subsystem: Laboratory Design

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
6.1.01	Spread of fire within laboratory hoods.	Improper or combustible (such as polypropylene) materials used for hood construction. Significant increase in combustible loading.	Contribute to rapid spread of fire resulting in personnel injury, death, and equipment and facility damage.	IB	Laboratory hoods should be constructed of materials having a flame spread index of 25 or less, and an acceptable smoke spread rating when tested in accordance with NFPA 255.	IE	3	1	NFPA 45 Ch. 6-9;NFPA 255	Open
6.1.02	Propagation of fire in hoods, or other areas not covered by general sprinkler system.	Inadequate fire protection, such as non-sprinkler protected hoods in areas where build-ups of flammable or explosive fumes occur, or in hoods made of combustible material.	Personnel injury or death, equipment or facility damage or loss.	IB	Install sprinklers in fume hoods where flammable or explosive fumes could migrate or accumulate, and in hoods made of combustible material.	IE	3	1	NFPA 45 Ch. 6	Closed
6.1.03	Propagation of fire in gas cabinets or other vented enclosures (areas not covered by general sprinkler system).	Toxic or highly toxic gases leaking from cylinder. Fire gas storage cabinet.	Personnel injury or death, equipment or facility damage or loss.	IB	Gas cabinets or exhausted enclosures for the storage or use of toxic or highly toxic gas cylinders shall be internally sprinkler protected.	IE	3	1	UFC 80.303(a)(3)(B);UFC 80.402(b)(2)(D)	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Facility Operations
 Subsystem: Computer Rooms

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
6.2.01	Fire in tape storage area. Fire spreading to tape storage area.	Record (tape storage) not separated from the remainder of the facility by 2-hour fire-resistive construction.	Toxic fumes developing from burning plastics. Essential data on tapes is lost.	IC	Separate the record storage areas from the remainder of the facility by 2-hour fire-resistive construction per nss 1740.11.	IE	3	1	NSS 1740.11 Ch. 703(f);NFPA 75 Sec. 7-2	Open
6.2.02	Fire spreading to computer rooms.	Lack of fire resistive occupancy separation.	Major computer and data loss.	IIB	The computer area shall be separated from other occupancies within the building by fire-resistant rated construction of not less than one-hour.	IIE	3	1	NFPA 75 Sec. 3-1.3;NSS 1740.11 Par. 703(f)	Closed
6.2.03	Fire spreading to computer rooms.	Lack of fire resistive occupancy separation.	Major computer and data loss.	IIB	The computer room shall be separated from other occupancies in the computer area by fire-resistant rated construction of not less than one-hour.	IIE	3	1	NFPA 75 Sec. 3-1.3;UBC Table 17-A	Open
6.2.04	Fire spreading to computer rooms.	Poor location of computer rooms in building.	Major computer and data loss.	IIB	Steam, water, or horizontal drain piping should not be in the space above the suspended ceiling and over computer equipment other than for sprinkler system use. Basement areas should not be considered for the location of a computer area. If computers	IIE	3	1	NFPA 75 Sec. 3-2.1;NFPA 75 Sec. 3-3.2	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Facility Operations
 Subsystem: Lasers

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
6.3.01	High energy release, shocks.	Ungrounded laser power supply.	Fire, injury, death.	IB	Provide fuses, circuit breakers, insulation, grounding, interlocks, etc., As necessary to prevent shocks and accidental high energy releases from laser power supplies.	ID	2	1	ANSI Z136.1;NSC Fund. of Indust. Hyg., Chapter 11	Open
6.3.02	High energy release.	Unprotected capacitors (laser power supply).	Fire, injury, death.	IB	Isolate laser power supply capacitors with screens, shields, barriers, or uninhabited rooms. Doors and covers shall be interlocked.	IE	3	1	ANSI Z136.1, Sec. 4.6.3, 4.6.4	Closed
6.3.03	Accumulated combustibles in hazardous areas.	Poor housekeeping.	Fire.	IIC	Maintain the laser target areas clean and clear of combustibles or flammable liquids.	IIE	3	2	ANSI Z136.1	Open
6.3.04	Accumulation of hazardous by-products from lasers.	Poor housekeeping, inadequate control of hazardous materials.	Fire, injury.	IIC	Provide proper containment and disposal of hazardous by-products from laser operations.	IIE	3	2	ANSI Z136.1, Sec. 7.3	Open
6.3.05	Unauthorized personnel in laser operation area.	No warning devices.	Personnel injury.	IIC	Provide necessary warning signs and devices to alert personnel of hazardous laser operations.	IIE	3	2	ANSI Z136.1, Sec. 4.3.9, 4.3.15, 4.7	Closed
6.3.06	Exposure of eyes to laser beam.	Improper laser position.	Personnel eye injury.	IIC	Laser beam elevation should be maintained at a level other than the normal position of the eyes of personnel in the standing or seated position.	IIE	3	2	ANSI Z136.1, Sec. 4.1	Open

Facility Hazard Analysis

Project: Earth Systems Science Building
System: Facility Operations
Subsystem: Clean Rooms

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
6.4.01	Recirculation of hazardous or flammable fumes from spill or leak in cleanroom.	Cleanroom design of air circulation system allows recirculation of air from areas with possible fume accumulations.	Personnel sickness or injury.	IIA	Ensure that cleanroom air cannot be recirculated in any areas where hazardous or flammable materials/ gases may be spilled. Provide maximum practical fresh air. Minimize dead air spaces.	IID	2	1		Open
6.4.02	Chemicals migrating to other parts of building during emergency in cleanrooms.	Chemical spill and/or equipment failure.	Personnel injury.	IIC	During emergencies cleanroom air shall have negative pressure relative to outside air, so no air (containing flammable/toxic fumes) will flow out of the cleanrooms.	IIE	3	2		Open

Facility Hazard Analysis

Project: Earth Systems Science Building
 System: Facility Operations
 Subsystem: General

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Control Number	Hazard Description	Causes	Effects	SP-1	Recommendations	SP-2	HRI 1	HRI 2	References	Status
6.5.01	Fire spreading.	Combustible materials and/or chemicals storage.	Catastrophic injury, possible system loss.	IC	Keep all building areas (including utility tunnel) free of combustible materials and chemicals to minimize risk of fire spreading.	IE	3	1	Site CHEMICAL HYGIENE PLAN;UBC Sec. 3305(a);UFC;NFPA 101 Sec. 5-5.1.7	Open
6.5.02	Increased danger of personnel. Injury/ death and property damage/ loss due to lack of communication, lack of inter facility coordination, and lack of centralized control and monitoring.	System/subsystem interfaces and facility enclosure interdependencies not considered in the planning and design of building.	Increased danger of personnel injury, death, and property damage or loss due to fire or other hazardous situation.	IB	Consider the interdependencies and interfaces of all facility systems (i.e. ventilation, electrical, fire protection, etc.) In relation to enclosure and the design of the support & services building.	ID	2	1		Open